

## CLAIMS

1. A repeater, wherein a cell identifier generator module is added to the downlink circuit structure of said repeater, said cell identifier generator module comprising: a synchronization searching unit for searching for synchronization signal of base station, a time delay unit for generating fixed delay between frame start time of cell identifier signal and frame start time of base station pilot signal, and a cell identifier signal generating unit for generating cell identifier signal code word; said time delay unit generating the fixed delay according to the searching result of the synchronization searching unit.

2. A repeater according to claim 1, wherein: the input end of said cell identifier generator module is connected to the low-noise amplifier module of the repeater, and the output end of said cell identifier generator module is connected to the power amplifier module of the repeater via a coupler.

3. A repeater according to claim 2, wherein said cell identifier generator module also comprises: a down-conversion unit, an A/D (Analog to Digital) conversion unit, a D/A (Digital to Analog) conversion unit, a up-conversion unit, and a filtering unit; wherein said down-conversion unit is designed to carry out frequency conversion from RF to intermediate frequency for received signals; said A/D conversion unit is designed to carry out sampling and quantification for intermediate frequency signals; said D/A conversion unit is designed to carry out D/A conversion to obtain base-band form of the cell identifier signal; said up-conversion unit is designed to carry out conversion from base-band to RF for the cell identifier signal; said filtering unit is designed to carry out band restriction for the cell identifier signal to control frequency leakage to adjacent frequency; said cell identifier signal is coupled to input end of power amplifier in the downlink circuit structure of the repeater via said D/A unit,

up-conversion unit, and filtering unit.

4. A method for positioning mobile station, comprising:

(1) Issuing cell identifier signal code word, fixed delay, and search window width for the mobile station according to the positioning request of the mobile station;

(2) The mobile station utilizing TDOA measuring function to measure TDOAs of cell identifier signal and base station pilot signal and reporting the measured data;

(3) Determining whether there is a time difference consistent to the fixed delay between cell identifier signal and base station pilot signal according to the reported data from the mobile station; if so, going to step (4); otherwise going to step (7);

(4) Reading calibrated value  $TOA_c$  of TOA between the repeater and the base station, and initiating RIT (Round Trip Time) measuring function of the base station to measure RIT of the mobile station, herein  $TOA_c = (1/2)$  RIT;

(5) Converting the measured RIT reported from the base station into measured value  $TOA_m$  of TOA, herein  $TOA_m = (1/2)$  RIT, which is the TOA from the mobile station to the base station via the repeater, subtracting the calibrated value  $TOA_c$  of TOA from the repeater to the base station from  $TOA_m$  and taking the result as TOA  $TOA_{trans}$  from the mobile station to the repeater, herein  $TOA_{trans} = TOA_m - TOA_c$ ;

(6) Calculating the distance between the mobile station and the repeater through multiplying  $TOA_{trans}$  with light velocity;

(7) Determining position of the mobile station with the mobile station positioning method.

5. A method for positioning mobile station according to claim 4, wherein said cell identifier signal is a scrambling code of the base station, which is different from that of the adjacent base stations.

6. A method for positioning mobile station according to claim 4, wherein said mobile station positioning method in step (7) is TDOA positioning method.

7. A method for positioning mobile station according to claim 4, wherein said mobile station positioning method in step (7) is TOA positioning method.